

WHAT IS CLAIMED IS:

- Sub
A1
- 1 1. A method of trimming a parametric surface, comprising:
2 obtaining a trimming texture based on a trimming curve
3 for the parametric surface; and
4 applying the trimming texture to the parametric surface.
- 1 2. The method of claim 1, further comprising rendering an
2 image based on the parametric surface and the trimming
3 texture.
- 1 3. The method of claim 2, wherein said rendering comprises:
2 drawing a plurality of pixels only in a solid portion of
3 the image that is not a trimmed portion.
- 1 4. The method of claim 2, wherein the trimming texture
2 comprises:
3 a first portion comprising a rendered section of the
4 parametric surface; and
5 a second portion comprising a trimmed section of the
6 parametric surface.
- 1 5. The method of claim 1 further comprising drawing a
2 plurality of pixels based on an allocation of the trimming
3 texture relative to the parametric surface.

SUB D1
1 6. The method of claim 1, wherein obtaining is performed in
2 a pre-rendering process and applying is performed in a run-
3 time process.

SUB A2
1 7. The method of claim 2, further comprising:
2 obtaining a material texture; and
3 drawing the material texture on the parametric surface
4 based on the trimming texture.

SUB D1
1 8. The method of claim 1, further comprising obtaining the
2 trimming texture from a plurality of trimming curves for the
3 parametric surface.

SUB A3
1 9. A method of trimming a parametric surface comprising:
2 obtaining the parametric surface;
3 obtaining a trimming curve for the parametric surface;
4 mapping the trimming curve on a trimming texture to
5 create a trimmed section and a rendered section;
6 obtaining a plurality of polygons approximating the
7 parametric surface; and
8 rendering the parametric surface based on an application
9 of the trimming texture to the polygons.

1 10. The method of claim 9, comprising:

2 obtaining a material texture for the parametric surface;
3 and
4 applying the material texture to a region of the
5 parametric surface corresponding to the rendered section of
6 the trimming texture.

1 11. An article comprising a computer-readable medium that
2 stores instructions for use in trimming a parametric surface,
3 the instructions for causing the computer to:
4 obtain a trimming texture based on a trimming curve for
5 the parametric surface; and
6 apply the trimming texture to the parametric surface.

1 12. The article of claim 11, further comprising instructions
2 for causing the computer to render an image based on the
3 parametric surface and the trimming texture.

1 13. The article of claim 11, further comprising instructions
2 for causing the computer to render an image by drawing a
3 plurality of pixels in a solid portion of the image that is
4 not a trimmed portion.

1 14. The article of claim 12, further comprising instructions
2 for causing the trimming texture to include:

3 a first portion comprising a rendered section of the
4 parametric surface; and

5 a second portion comprising a trimmed section of the
6 parametric surface.

1 15. The article of claim 11, further comprising instructions
2 for causing the computer to draw a plurality of pixels based
3 on an allocation of the trimming texture relative to the
4 parametric surface.

1 16. The article of claim 12, further comprising instructions
2 for causing the computer to:
3 obtain a material texture; and
4 draw the material texture on the parametric surface based
5 on the trimming texture.

1 17. The article of claim 11, further comprising instructions
2 for causing the computer to obtain the trimming texture from a
3 plurality of trimming curves for the parametric surface.

1 18. An article comprising a computer-readable medium that
2 stores instructions for use in trimming a parametric surface,
3 the instruction for causing the computer to:
4 obtain the parametric surface;
5 obtain a trimming curve for the parametric surface;

6 map the trimming curve on a trimming texture to create a
7 trimmed section and a rendered section;
8 obtain a plurality of polygons approximating the
9 parametric surface; and
10 render the parametric surface based on an application of
11 the trimming texture to the polygons.

1 19. The article of claim 18, further comprising instructions
2 for causing the computer to:
3 obtain a material texture for the parametric surface; and
4 apply the material texture to a region of the parametric
5 surface corresponding to the rendered section of the
6 trimming texture.

1 20. An apparatus for use in trimming a parametric surface,
2 comprising:
3 a memory which stores computer instructions; and
4 a processor that executes the computer instructions to:
5 obtain a trimming texture based on a trimming curve for
6 the parametric surface; and
7 apply the trimming texture to the parametric surface.

1 21. The apparatus of claim 20, further comprising
2 instructions to cause the computer to render an image based on
3 the parametric surface and the trimming texture.

1 22. The apparatus of claim 21, further comprising
2 instructions for causing the computer to render an image by
3 drawing a plurality of pixels in a solid portion of the image
4 that is not a trimmed portion.

1 23. The apparatus of claim 21, further comprising
2 instructions for causing the trimming texture to include:
3 an first portion comprising a rendered section of the
4 parametric surface; and
5 a second portion comprising a trimmed section of the
6 parametric surface.

1 24. The apparatus of claim 20, further comprising
2 instructions for causing the computer to draw a plurality of
3 pixels based on an allocation of the trimming texture relative
4 to the parametric surface.

1 25. The apparatus of claim 21, further comprising
2 instructions for causing the computer to;
3 obtain a material texture; and
4 draw the material texture on the parametric surface based
5 on the trimming texture.

1 26. The apparatus of claim 20, further comprising
2 instructions for causing the computer to obtain the trimming

Sub B₃
4 texture from a plurality of trimming curves for the parametric surface.

Sub A₇
1 27. An apparatus comprising a computer-readable medium that
2 stores instructions for use in trimming a parametric surface,
3 the instruction for causing the computer to:
4 obtain the parametric surface;
5 obtain a trimming curve for the parametric surface;
6 map the trimming curve on a trimming texture to create a
7 trimmed section and a rendered section;
8 obtain a plurality of polygons approximating the
9 parametric surface; and
10 render the parametric surface based on an application of
11 the trimming texture to the polygons.

Sub B₃
1 28. The apparatus of claim 27, further comprising
2 instructions for causing the computer to:
3 obtain a material texture for the parametric surface; and
4 apply the material texture to a region of the parametric
5 surface corresponding to the rendered section of the trimming
6 texture.

Sub B₃
29. A method for use in rendering images from data for an original three-dimensional model, comprising:

3 obtaining a trimming texture based on a trimming curve
4 for the three-dimensional model;
5 applying the trimming texture to the three-dimensional
6 model; and
7 rendering an image.

1 30. The method in claim 29 wherein rendering comprises
2 drawing a plurality of pixels based on an allocation of the
3 trimming texture relative to the three-dimensional model.

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APPENDIX

Let $S(u,v)$ be a vector-valued function that generates the parametric surface.

Let $C_1(t)$, $C_2(t)$, ..., $C_n(t)$ be vector-valued functions that
5 generate trimming curves for the surface.

Assume the existence of a function, `Tessellate()`, that generates a list of triangles approximating the surface. Also assume that the triangles generated by `Tessellate()` have texture coordinates that correspond to the parameters u and v
10 used to generate the surface points.

Assume the existence of a function, `DrawTexturedTriangles()`, that draws a list of triangles while applying an alpha-channel texture to the triangles. Where the alpha-channel texture is transparent, no pixels will be drawn
15 to the screen.

Let T be an alpha-channel texture whose alpha-channel is initialized to completely opaque.

Once, up-front, for each trimming curve, C_1 , C_2 , ..., C_n , draw the curve on T and then fill the trimmed portion of the
20 curve with transparent pixels.

Each time the surface needs to be rendered:

- Call `Tessellate()` to get a list of triangles, L
- Call `DrawTexturedTriangles (L, T)` to draw the list of triangles, L , using the alpha-channel texture, T
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